The State of Foresight in Food and Agriculture: Challenges for Impact and Participation

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Abstract
Actionable foresight for food and agriculture faces the double challenge of including, and impacting on multiple stakeholders. We present here a state of the art of participation, stakeholder inclusion and impact of 38 recent foresight studies on food and agriculture. All cases were selected through a worldwide survey in seven languages, a bibliography and multi-lingual web review, and a review by a group of foresight experts. Our results indicate that global foresight studies are led by experts or scientists from international organizations or national organizations from advanced countries, with rather limited participation of stakeholders, while more local studies are more inclusive and directly linked to policy making. Leadership in foresight by least developed countries', farmers' or civil society's organizations is marginal. While there is more than anecdotic evidence of the impact of these foresight works, this is rarely documented. The paper combines literature review and case study to provide evidence on the links between stakeholder inclusion and impact and presents the Global Foresight Hub, an innovative initiative at global level for strengthening participation, inclusion and impact of foresight in food and agriculture.

1. Introduction

During the second Global Conference on Agricultural Research for Development (GCARD2)[1] held in October-November 2012 in Punta del Este a group of representatives of Farmer Organisation and Civil society organisation jointly declared their intention to engage in a grassroots foresight on the futures of family farming[2]. This initiative arose from interactive discussions on the current state of foresight in food and agriculture and related debate on the voices of small holders farmers in shaping research priorities. This is an important step in fostering stronger stakeholder inclusion in foresight on food and agriculture. The issues of participation, stakeholder inclusion and impact of foresight were debated at the GCARD2 as a result of a comprehensive review of existing foresight works in this field. The purpose of this paper is to draw lessons from this inventory and highlight practical actions which are undertaken to improve stakeholder inclusion in foresight on food and agriculture and the expected impact that can be derived from it. The first section presents the sources of information and material used as well as the survey methodology. The second section highlights main results related to the current state of participation and stakeholder inclusion in foresight on food and agriculture. The third section provides food for thought on impact of foresight. We conclude with a discussion on the implications for "improved foresight" coined in the GCARD Roadmap as a "*...forward-looking, anticipatory research and analysis integrating a range of perspectives on key issues, making use of the best available data and interpretations from different sources and directly integrating the diverse views of farmers and other stakeholders on specific problems, so that important issues are examined through multiple 'lenses'"* [1]. This concept is fully consistent with the concept of foresight defined by the European Commission as follows: "*a process which combines three fundamental elements: prospective (long-term or forward-looking) approaches, planning (including policy-making and priority-setting) approaches, and participative approaches (engaging stakeholders and knowledge sources)"*[2]. The creation of a global foresight initiative linked to agricultural research for development, the Global Foresight Hub[3], fostering stronger involvement of stakeholders in foresight is then presented as a direct outcome to which the grassroots foresight initiative is linked.

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[1] GFAR in partnership with the CGIAR and the Government of Uruguay organized the GCARD2. The purpose of GCARD2 was to move from what transformation of agricultural research for development (AR4D) is required, to how to implement the GCARD. More than 600 people from all sectors and all around the world and more than 1000 online followers particpated. For more on the GCARD process see : http://www.egfar.org/gcard

[2] See a video of this declaration on …

[3] See http://www.egfar.org/our-work/shaping-future-together/global-foresight-hub

2. An Inventory of recent foresight studies on food and agriculture

In 2010 a group of foresight practitioners developed a first analysis of the outcomes of foresight studies and presented their results at the GCARD1 in Montpellier. This synthesis focused on the content of global foresight studies related to food and agriculture. Their conclusion were presented during the GCARD and are summarised in Hubert et al [3]. A second step was developed for the preparation of GCARD2 through a more comprehensive and systematic inventory of foresight studies at various scales.

2.1 Data collection

The inventory combined different approaches to enable verification of information from different sources, in particular a worldwide survey, examination of websites of organizations for information related to foresight and document review. The survey was prepared in seven languages. It included questions about the activities of the individuals/organizations contacted related to exploring the future evolution of, or future challenges in agriculture or rural development in the next 20 years. Questions focused on the outcomes, the topics, and the involvement of the respondents in these activities.

We used a web-based survey provider to administer the questionnaire. The survey was available online for seven weeks with three reminders sent during this period. Of the 5848 emails sent, 93% were successfully delivered. We received 1136 responses, of which 54.6 % were completely exploitable. The data was organized and analysed using MS Windows Excel and NVivo.
More than 400 respondents indicated that they had engaged in foresight activities related to food, agriculture, and rural development and informed us that their work was documented and that they were willing to share it. We contacted all of them and asked for the documents. A group of 11 foresight specialists[4] screened these documents using the three following criteria: i) recent (less than 5 years), ii) looking at least 10 years ahead, and iii) related to agriculture/rural development/farming systems. Only documents scoring a positive answer to all three criteria were finally kept for the analysis.

A multi-lingual group of interns conducted also a bibliography and web review in search for other works which might have been overlooked. In total, we found 65 more or less well documented relevant studies. Some other foresight studies might not have been included, but we believe that these would not be so many as our search process was quite extensive and our respondents were also asked to inform us about other studies they might be aware of. The selected relevant cases provide, so far, the most comprehensive update on recent foresight studies on food and agriculture.

The cases are supported by a great diversity of documents, ranging from slide shows to referred journal articles, including various type of grey literature such as internal reports. In order to enable a wider audience to access these works and easily find their key messages, we proposed to the authors to produce shorter, concise and attractive four-page Briefs. Each Brief had to provide the same set of key elements and messages on content, process, impact and lessons learned.

We organized three write workshops for the authors to facilitate the production of these Briefs. One workshop was conducted for Europe, Central Asia, Near East and Africa, one for Asia and the Pacific, and one for the Americas. Some of the authors who could not attend the write accepted to work on the Brief remotely. We created a series "*The Futures of Agriculture*" which is available through open access[5]. The series has so far 41 Briefs of which 38 are foresight or synthesis of future studies and three are regional updates on research needs. This paper is based on these 38 Briefs and focus on the

[4] Reviewers were from International Research Centers (4), Universities (3), National research Centers (3), and National research Organizations (2) and eight different countries: Argentina, Australia, Brazil, France, Germany, The Netherlands, South Africa, Tanzania and the UK.

[5] http://www.egfar.org/our-work/shaping-future-together/global-foresight-hub/publications

process used to develop these foresight studies in particular participation, inclusion and impact. Results on content, i.e. key issues and future challenges are nor detailed here.

2.2 Overview of the inventory

The Briefs includes twelve global studies, all of them focusing on agriculture, ten regional studies, four focusing on food and agriculture, three on rural societies, one on low carbon society, and sixteen national studies, seven focusing on the future evolution of agriculture, three on research priorities and research systems, two on territorial development and one on climate change.

In the analysis of the drivers of the future - the forces which have potential in shaping the transformation to come - presented in these documents we differentiate "usual" drivers very often associated with trends, which will induce the pursuit of the current path in a somehow predictable way, and "new/emerging drivers" which are becoming increasingly recognised in recent foresight as potential forces which can bring discontinuities leading to different paths [4].

In the first category climate change technology market forces demography and growth and income were respectively cited twenty-two, twelve, ten, nine and five times. In the second category policy and governance, consumer behaviour and social values were cited twenty-eight, twelve and ten times [4]. The increasing role of policy, behaviour and social values as endogenous drivers is a rupture with the former practices of foresight in food and agriculture. In the past, foresight studies usually concluded with policy recommendations and considered policies as external factors. Today decision-makers are no longer seen merely as end users. This finding was coherent with the "policy shift" highlighted by Popper in the European Foresight Monitoring Network (EFMN) inventory [2]. Foresight on food security, agriculture and rural development is joining the third generation of foresight [5] where a social perspective is added to the traditional technology and market perspectives and social factors and behavior are becoming major drivers of change [6][7]. This evolution has major implications on the process of implementing foresight work in particular with regards to who does foresight, who is included and what are the impacts. The challenge for future foresight work is to integrate more systematically these new drivers in the analysis, rather than considering them as external factors. This means working on understanding how and why policies and societal values could evolve. As a result, future foresight work will have to focus more on ways and means by which people may change their attitudes and behaviors as citizens and consumers in order to provide more knowledge about the link between "people, profit, and planet" (EURURALIS). It will have to account more for diversity taking into consideration variations at local/national level as multiple drivers do lead to different potential evolutions in different context.

2.3 Why and who engages in foresight on food and agriculture?

In order to discuss the results of the inventory related to participation and inclusion we need first to clarify why and who engages in foresight. People engaging in foresight may pursue different objectives such as policy advice, advocacy coalition, social forums [5][8], or priority-setting, networking, building visions [9]. Foresight objectives can be instrumental or informative [10], or may have a result-oriented purpose or a participation-oriented purpose [11].

	Generate information	**Generate action**	**Foster Cooperation and networking**
Number	32	24	5
Proportion	84%	63%	13%

Table 1. Distribution of objectives in the inventory of foresight (38 cases)

We used a combination of these different objectives as identified in the literature to build three categories of objectives for analyzing the cases as indicated in Table 1. Generation of information largely predominates with only six cases not mentioning it. Almost two-thirds of the cases are targeting actions usually through policies. While cooperation and networking is often mention in these

works, it does not appear as an *ex ante* objective, but rather as a (positive) effect. In addition, 60% of the cases combined at least two objectives, mainly generation of knowledge and generation of action. An interesting point is that though the majority of the cases pursue actionable foresight, around one third of them do not claim to have as a deliberate objective implemented actions. Some foresight practitioners claim the right to engage in foresight as a heuristic activity whose results are not necessarily sought to change things, at least not directly and not as an explicit objective. This must be taken into consideration when discussing both participation and impact/influence of foresight.

3. Participation and stakeholder inclusion

3.1 Participation and foresight: background

There is a growing common recognition that foresight tends to increasingly pay attention to participation [8][13] [6]. Participation is now becoming a standard practice [15]. Public participation tools are crucial for creating better futures [16]. For many authors participation is now an intrinsic component of foresight [2] [17]. Specific forward looking approaches are becoming defined by their participatory nature.

Debates on participation include several interconnected dimensions. Participation needs therefore to be further qualified. First two quantitative dimensions of stakeholder engagement can be highlighted: extensive and exclusive [10]. Extensive engagement means that a high number of diverse stakeholders are enticed to participate while the exclusive engagement restricts participation to a (smaller) number of selected stakeholders. Second there is a need to distinguish between the width and the breadth of participation, that is between the quantity of stakeholders involved and the quality of their involvement, arguing that depending on the objective quality may sometimes substitute to quantity [7] [15]. A key factor determining the nature of participation is the objective of foresight, where one can distinguish between reactive and constructive involvement [11], with diversely intensive stakeholder engagement characterizing low, medium and high levels and relate them to changes in their value networks and commitment to action [13]. A further useful distinction between informative and instrumental outcomes bears direct consequences on expected actions and related commitment and articulation with stakeholders and policymakers [10].

Stakeholder participation in foresight is justified by several arguments, including relevance and legitimacy [11][15], more efficient implementation of agreements [13], enhancement of coordination and mobilization effect, negotiation of consensus in order to contribute to a normative debate on desirable future development paths, variety of perspectives and kinds of knowledge to generate community empowerment, increased stakeholder buy-in [8][11]. Participation is crucial to reach shared goal and vision [17][18]. This multiplicity of reasons for participation in foresight leads to question the extent to which the participation discourse corresponds to a genuine, inclusive and effective type of participation [21]. This would call for a systematic analysis of participation in foresight, based on how the perspectives of the participants, and in particular stakeholders are incorporated in the process.

When participation takes place? In the *core-perimeter constellation* concept a small group of participants (usually an expert group) is permanently and heavily involved while stakeholders are less closely linked to the whole process [7]. This concept entails an *inclusive middle stage* where more stakeholders are engaged in the foresight exercise than at the beginning and the end, usually through consultation and sharing of opinion. However, critical decision is often made at the beginning and at the end of the process, he observes.

Who are the stakeholders/participants? The decision of who needs to be involved is related to the purpose of the study [11]. Accordingly, actionable foresight directed at shaping policy and decisions

[6] This discussion focus on direct, "physical" participation of people in foresight exercises. I am not referring here to online participatory foresight and policy making as discussed by Hilbert et al 2009 in Latin America for example [14], though I recognized that new information and communication technologies are potential drivers of significant ruptures in the future practice of foresight.

require stakeholder inclusion, while knowledge generating innovative, creative foresight may be hampered by stakeholders conventional views. A useful way of looking at participation is to differentiate experts, stakeholders and decision-makers. Decision-makers though they play a key role in turning foresight into action are not usually heavily involved in the foresight process: "*it seems that foresight can better be characterized as an exercise* for *decision-makers than* by *decision-makers*" [7:1163]. Decision-makers participation in foresight is also justified by the observation that if not involved in the formulation of actions during the foresight process decision makers may resist their implementation [22].

Yet, the issue of participation in foresight is still controversial. Participation is challenged. Participation can be seen more as a burden especially when it comes to wide stakeholder engagement [13]. Participants may also bring a bias in a foresight exercise especially when building normative scenarios which may reflect more a public relation agenda and known variation than a genuine exploration of possible variations[23].

Several authors have developed some new concepts linking more closely foresight and participation. "Adaptive foresight" is a combination of foresight and adaptive planning based on the statement that foresight needs to go beyond the level of a collective process and be brought down to the level of individual actors' strategies [8]. It combines phases of open participation with closed processes of targeted strategy development. "Inclusive foresight" has six objectives, four of them being partly or fully addressed through public participation: creating awareness, anticipate desirable futures, create policy processes and meet societal expectations related to decision making processes [21]. "Integrative foresight" is fundamentally participatory; it is a process of engaging in futures inquiry which is inclusive of diverse perspectives, yet dealing with common challenges [21]. "Participatory scenario-building" is proposed as a useful and desirable approach, especially at local level, to foster political responsibility, engagement and action [25].

Finally the importance of participation in foresight is witnessed by authors who consider that participation can be an evaluation indicator for the success of a foresight work, both in terms of quantity (number of participants) and quality (in particular the influence on policy outcome) [5].

3.2 Participation in foresight on food and agriculture

Twenty-two out of 38 cases are regional or global cases, the others being national or subnational cases. As this inventory is not exhaustive these numbers do not indicate the real proportion of the different scales of foresight. However it is relevant to note that all but two global and regional cases were led either by international organizations (such as IFPRI or FAO), regional organization (the European Commission, FONTAGRO, APEC) or research organization in developed countries (France, Netherlands, Sweden, Taiwan, UK). This reflects the current distribution of foresight capacities in food and agriculture worldwide. National foresight capacities are also more developed in emerging countries (Brazil, Thailand, Indonesia, South Africa).

The only cases of foresight in sub-Saharan Africa are from South Africa, the most developed country of the continent or they result from a cooperation with a regional or international organization. We could not identify recent national foresight work according to our criteria a part from these cases.[7] This finding is consistent with Popper's inventory for the EFMN stating that Africa remains underrepresented [2]. Yet, foresight on food and agriculture in Africa is included in some international foresight activities (UK-FFF, BFP-CIAT, CCAFS). Similarly we could not find recent foresight work in Central Asia and the Caucasus. None of the Least Developed Countries has been identified as having engaged in any foresight activity at any scale by their own means.

The large majority of the foresight exercises are initiated by the own organizations who conducted the work. This is true for all international organization (IO) and for National Science Institutions (NSI)

[7] Though the inventory cannot be exhaustive, there is no available evidence of recent foresight works in agriculture and rural development in Africa with exception of Morocco.

and half of the government organization (GO). Global foresight works are in large majority developed by global organizations for their own use (IFPRI) or because it is part of their activity (FAO). National foresight works are more often conducted upon demand from national authorities and usually executed by units/organizations within the national systems.

Demand-driven foresight represent less than the third of the cases. Logically, this is reflected in the scale of analysis; GO and NSI in developing countries all undertake national level foresight, while in developed countries a substantial number of them undertake also regional or global foresight (France, Netherlands, South Africa, Sweden, UK).

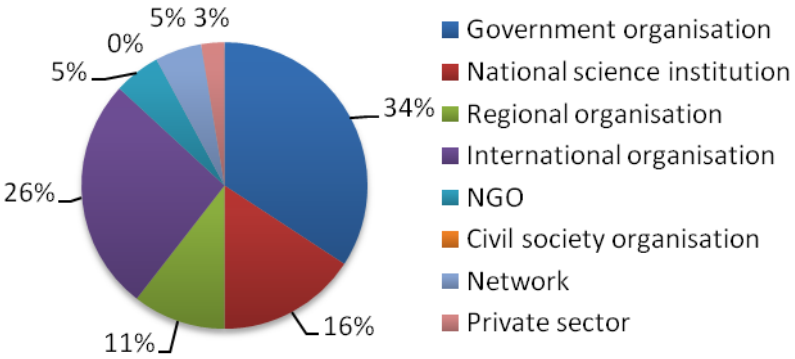

Figure 1. Distribution of foresight cases according to the origin of the request for the exercise.

To analyze the scale of inclusion of the various constituencies who are directly concerned by the outputs of the foresight works, we were facing the same difficulty as for the EFMN inventory in analyzing diversity [2]. The scale of inclusion is not a perfect proxy, but it helps revealing some useful facts. As for the EFMN results, we find that most of the foresight works included no more than 50 persons (Figure 2). Of the twelve global cases analyzed, only two of them (DUALINE and UK-FFF) involved more than 50 persons. Most of the quantitative global foresight works were reported by their authors as not or little participatory. Four regional foresight works involved less than 50 persons. Only one involved more than 200 persons (APEC-LCS). At national level, seven cases involved less than 50 persons, while three of them involved more than 200 persons (FORE-CAN, Quebec, Taiwan-2025).

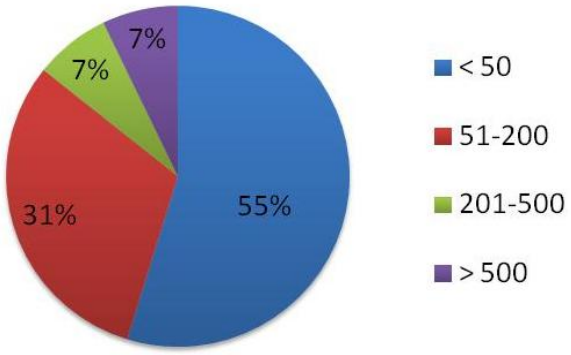

Figure 2. Distribution of foresight cases according to the origin of the request for the exercise.

Many cases highlight the importance of using scenarios to foster discussion enabling to experiment, hold constructive debate among stakeholders with diverging interests, sensitize participants to future research, raise societal awareness about future challenges, generate co-solutions and shared vision.

Several lessons learned from stakeholder involvement can be reported. Stakeholder involvement is crucial for ensuring full implementation and for broadening the knowledge based. However,

stakeholder involvement has implications on the foresight work. The first one is that frame-breaking (that is, deeply challenging a paradigm) may be berated by some stakeholders who support the paradigm. The SCAR3 case invokes the absence of stakeholders as a means to reach frame-breaking considerations. Yet, not having stakeholders on board could jeopardize the capacity of foresight to influence stakeholders behavior. One case shows this dilemma with a powerful stakeholder able to impede the implementation of actions resulting from the foresight work, while its presence in the work itself would have not allowed to reach the same conclusions (Quebec). The SUAS-2050 case highlights that a broad representation of stakeholders had the double virtue of enlarging the identification of more complex knowledge gaps than if exclusively done through an academic perspective and the inclusion of more long-term aspects than if only private sector and policy sectors had dominated the scene. Foresight has virtues as a participatory process for consensus building through stakeholder involvement but this does not guarantee success in case of strong stakeholders divergence of interests.

3.3 Patterns of participation

A multiple correspondence analysis (MCA) performed on the cases (called observations), using four variables (method, inclusion, request and scale) enables us to identify some patterns related to the current state of foresight in food and agriculture. Figure 5 below displays the results of the MCA on the two principal axes which explain 63% of the distribution. It is possible to distinguish three major patterns represented by the corresponding oval areas on the graph.

The first pattern represented (plain line) regroups a cluster of cases characterized by the following states of the four variables to which they are graphically close : international scale (scale-1), initiated by international organization (method-4), limited participation (inclusion-1) and quantitative/ combined method (method-1 and method-2).

The second pattern (long dash line) regroups a cluster of cases characterized by the following combination: regional scale (scale-2), initiated by regional organizations (request-3), wider participation (inclusion-2), and qualitative methods (method-3).

The third cluster (square dash line) regroups cases characterized by a national scale (scale-3), initiated by government organizations or national science institutions (request-1 and request-2), with participation mainly very limited or somehow expended (inclusion-1 and inclusion-2) and combined or qualitative methods (method-2 and method-3).

The graph shows also that higher level of stakeholder participation (inclusion-3 and inclusion-4) are located at the periphery confirming that highly inclusive foresight in food and agriculture is not a very common practice. Similarly the position of request-5 representing the cases (Oxfam, SAMAQQ, ENDURE, SASP) initiated by other organizations than IO, RO, NSI and GO are marginal. Conversely method-2 has a central place at the convergence of all clusters (combined method used by all) while inclusion-2 is located between the regional and national clusters (at this scale more participatory)

The cases located outside of the areas present specific features. The UK-FFF, Quebec and Taiwan-2025 are national cases with very large participation and therefore outside the areas which represent a majority of cases with more limited participation. Oxfam is drawn by its uniqueness as a global foresight initiated by a NGO, while PARME is characterized by the fact that it is a regional case initiated by a government organization. The BFAP case is a national case with a quantitative method and limited participation.

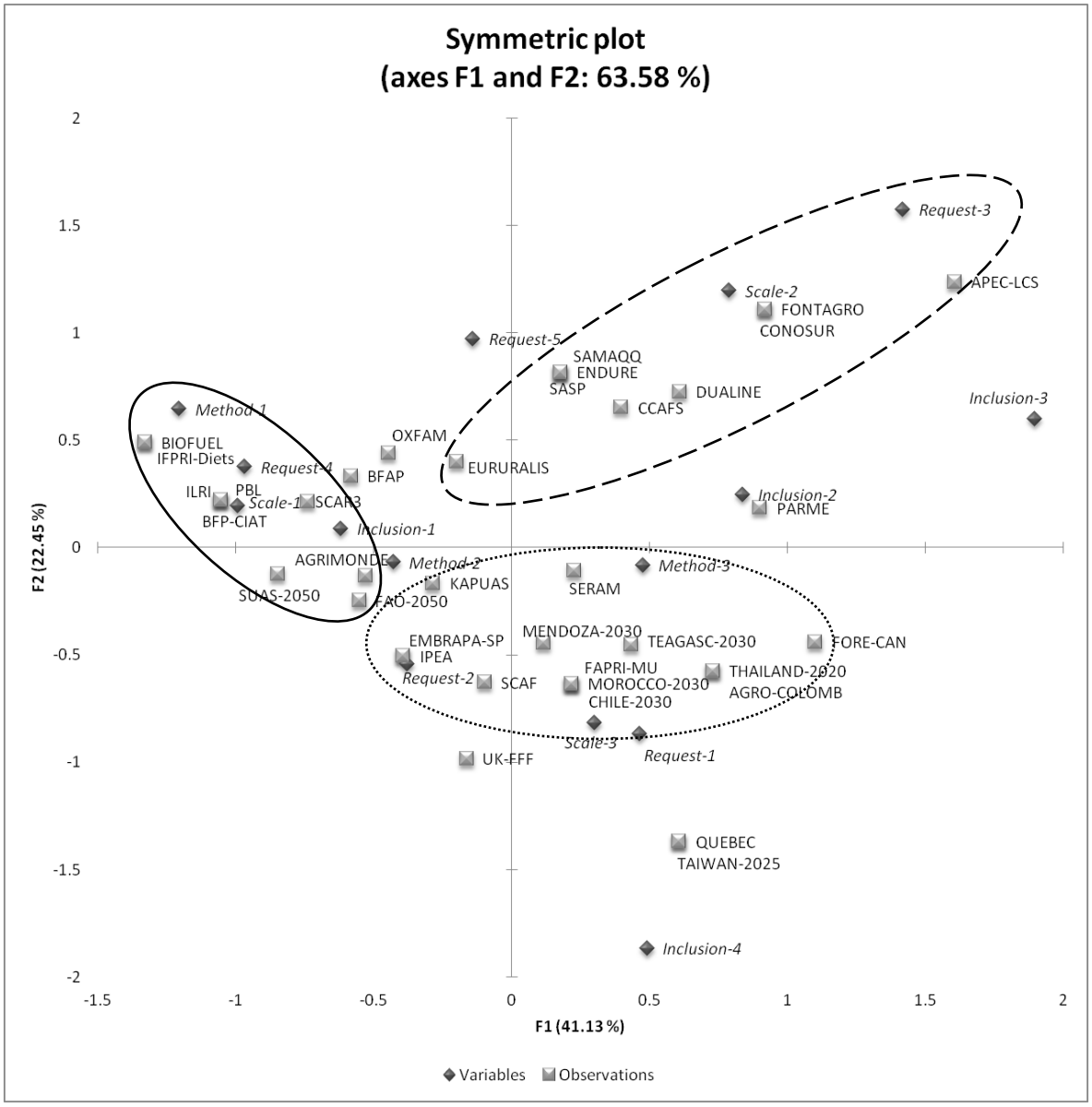

Figure 3. Spatial representation of a multiple correspondence analysis applied to 37 cases and 4 variables.

4. Impact: Influence and Change

4.1 Impact and foresight: background

A review of the recent literature on foresight impact indicates that different types of impact are related to different types of foresight [5][10]. The most common distinction is the impact of foresight as a process and the impact of foresight as an undertaking producing outputs such as scenarios (or instrumental outcomes [10]). Some authors argue that impact is more related to the process (networking effect, learning, awareness) than to the actual output of the foresight study[12][15], or clearly link impact to the modification of the perceptions and expectations of the actors involved as a result of a process, insisting on the need to ensure a link between the collective foresight process and the decision making process[8]. Examples of change induced by foresight works include the IPCC scenarios on mitigation policies, though awareness was more the driver of change than the normative most desirable scenario[26].

However, many authors point out critical challenges and limits to the potential impact of foresight. One of these challenges lies in the continuum between foresight activities *per se* and the decision making process leading to these activities to have an impact. Commissioning out scenarios to external consultants may be a limiting factor for impact on decision-making [15]. This issue was also raised

asking how different the foresight outputs were from any other outputs in terms of policy information [5], highlighting the need to understand what drives the behaviour of the bodies which are expected to turn these outputs into implemented actions [5][12]. In addition, attribution of policy decision to foresight is a challenge as there is usually no acknowledgment from policy makers to their sources when they make a decision[10]. Foresight may yield indirect or even unexpected impacts which may not be captured for this reason[10][18].

In order to improve foresight impact, authors suggest to go beyond the collective process and to guide individual actors in decision-making or propose to pay more attention to times of uncertainty and doubt they call "windows of opportunity," and to focus on related issues as a way to improve likeliness of impact [8][15]. While without appropriation by the actors involved, action derived from anticipatory works would be impossible[27], stakeholders buy-in may be necessary but it is not a sufficient condition resulting in implementation of actions[26]. The suggestion to have decision-makers involved in both exploratory and normative phases of foresight resonates thus with the challenge of linking the foresight process with the decision making process by articulating the capacity of foresight to influence the participants and to provide outputs that are amenable to policy decision and implementation [18]. As a policy instrument require time and resources, foresight should aim at producing desirable impacts in order to justify the investment it requires [7].

Foresight impact evaluation is still a weak element and many authors acknowledge that there are indeed very few impact assessments [8][15]. Foresight impact evaluation faces two methodological challenges; one is the longer time frame for the assessment [10][15] and the second is the attribution of impact to foresight among many other factors [15].

4.2 Impact of foresight in food and agriculture: results

The purpose of this analysis is not to assess the quality of these works but to show what kind of impact can be expected from foresight, to document it and bring elements for thought about making foresight more actionable. In addition, as the inventory concentrated on recent foresight works, many authors indicated that it was too early for a complete analysis of impact. The framework used to analyze and discuss the impact of the foresight cases differentiates two impact categories: a soft impact that we call "influence" and a hard impact that we call "change". Influence as reported in the cases cover two different types: i) raising awareness and fostering debates (RA/FD) beyond the "doers" of the foresight work, and ii) linking stakeholders (LS) who would not have interacted together without the foresight work. Change encompasses also three types dimensions as follows: i) a transformation of internal policies/priorities/orientations (TIP) which would not have happened without the results of the foresight work, ii) a transformation of external policies/priorities/orientations (TEP) which would not have happened without the results of the foresight work and iii) organizational/functional changes (OC). Results are presented in Table 2.

All cases reported at least one category of impact, with a median at two and a maximum at four. Nine cases did not report any impact in the "change" category. These works indeed did not intend to generate changes, but to provide knowledge and through the dissemination of this knowledge and eventually linking different stakeholders contributed to influence the debate on the topics they developed. More than two-thirds of the cases reported having contributed to raise awareness and fostered debates, modifying the perceptions and understandings of those they gave involved beyond the core group which conducted the work. This occurred at all levels. In some cases, the "provocative" or challenging nature of the results has triggered interests of wider circles of stakeholders. Somehow surprisingly, linking stakeholder is not very often reported as an impact of the foresight work. Our interpretation is that bringing together different stakeholders and linking them through a foresight process was more considered as a means to achieve the expected results of the exercise rather than a significant impact in itself worth to be reported as such.

Two-third of the cases also reported having contributed to transform policies or priorities internally and/or externally. This is an impressive result given that we asked the authors to look for evidence of this kind of impact. Evidence was sometimes not so well documented but in several cases there was a

clear link of between the outputs of the foresight work and transformation in policy or research priority. All foresight works which reportedly have generated change through the transformation of policies are commissioned/requested by a decision maker, either internally or externally. One third of the foresight works analyzed have induced new policy or priorities within the organizations which engaged in these works. Direct change means in these cases the implementation of internal policies or internal actions oriented by the results of the foresight work. All of them but one are either national or regional cases.

Several cases report evidence-based change in external organizations directly related to their results. The formulation of new research priorities in the Irish agri-food sector was shaped by the results of Teagasc-2030. Outcomes of the BFAP scenarios were incorporated in the strategic planning of the red meat industry in anticipation of the 2010 FIFA World Cup. CCAFS scenarios process is engaging in strategic planning with key regional bodies such as the eastern African Community General Secretariat. The French National Research Agency explicitly refers to PARME foresight in its 2012 Call for Proposal. The Netherlands government Health Council and the European Commission have used PBL foresight studies to underpin policies on food, agriculture and environment. The Secretariat for Environment of the Provincial Government of Mendoza has incorporated the foresight framework and the scenarios in the formulation, execution and diffusion in its Environment Management Plan and in the Provincial Law for Territorial and Soil Use Classification. US executive branch officials, industry groups, or legislators make request to FAPRI-MU for research or for analysis of specific policy options. Brazil's Nationally Appropriated Mitigation Actions, National Policy for Climate Change and "Programa ABC" are based on the knowledge generated by the SCAF-Brazil case. The Maroc-2030 foresight contributed to the formulation of the "*Plan Maroc Vert*" (Green Morocco Plan) leading to a major transformation of national policies for agriculture and rural development.

Category of impact	Influence			Change		
*Impact dimension**	*RA/FD*	*LS*	*DM*	*TIP*	*TEP*	*OC*
SCAR3 [29]	x			x		
Oxfam[30]	x			x		
CCAFS[31]	x			x	x	
Teagasc-2030[32]				x	x	X
ENDURE[33]	x					
EURURALIS[34]			x			
PARME[35]					x	
IFPRI-Biofuel[36]	x		x			
BFAP[37]					x	
SAMAQQ[38]	x					
DUALINE[39]				x		
SASP[40]	x	x				
IFPRI-Diets[41]	x					
Agrimonde[42]	x					
PBL[43]			x		x	
KAPUAS[44]	x	x				
Taiwan-2025[45]	x			x		
APEC-LCS[46]				x		
BFP-CIAT[47]	x					
Thailand-2020[48]	x			x		
FONTAGRO[49]	x			x		
FORE-CAN[50]	x	x		x		
FAPRI-MU[51]			x		x	
CONOSUR[52]				x		X
SCAF-Brazil[53]					x	
Mendoza-2030[55]	x	x			x	
IPEA[56]	x				x	

Chile-2030[57]				x		X
Quebec[58]	x					
EMBRAPA-SP[59]				x		
Agro-Colombia[60]				x		
FAO-2050[61]	x			x	x	
SERAM[62]	x	x		x		X
SUAS-2050[63]	x			x	x	
Morocco-2030[64]	x			x		
UK-FFF[65]	x			x	x	
ILRI[66]	x	x				
TOTAL	24	6	4	19	12	4

Table 2. Type of impact as found in the case studies
** Acronyms are explained in the first paragraph of section 4.2*

In most cases, influence or change were reported because we directly ask this question and requested the authors to reflect on impact and to provide supporting evidence. Though a large number of cases reported significant impact, very few have recorded evidence, a result consistent with the output of the literature review on the impact of foresight. Evidence has been given mostly as narratives and concrete examples. Given the results of our analysis showing that, indeed, foresight has the capacity to influence our visions or to change our priorities, future foresight work, especially "foresight for change" need to include impact monitoring processes. So far, no cases had a built-in provision of resources for impact monitoring or assessment, nor a clear strategy of how to achieve impact, not even a communication plan. The most advanced cases are UK-FFF for which a "one-year" impact analysis was conducted worldwide by a foresight follow-up team [28] and the SUAS-2050 case which was assessed in 2012 by a scientific panel and a stakeholder panel.

5. Discussion: toward Improved Foresight

In this section we discuss two major challenges which need to be addressed in order to increase the likeliness of foresight to shape the future of food and agriculture. The first challenge is to bridge both a sectorial divide and a geographic divide. The second challenge is to bring the practice of foresight closer to decision making processes. The Global Foresight Hub (GFH), an initiative of the GFAR, is then presented as a global arena offering the possibility to face these challenges with practical actions.

5.1.Challenges for stronger participation and impact of foresight in food and agriculture

5.1.1. Opening foresight to a wider range of practitioners, stakeholders and decision makers

Our results show that there is a great divide in the foresight landscape in food and agriculture, with Civil Society Organizations (CSO) being almost completely absent while the only two Non Governmental Organizations (NGO) involved are both operating at a global scale (Oxfam, Agropolis International). This divide adds up to the divide between advanced and emerging countries on one hand and less developed countries on the other hand. As a result, farmers' and civil society's organizations in less developed countries, who probably most need to engage in foresight about the futures of food, agriculture and rural development because they are the most directly concerned, are the less present and active. Their absence is a worrying situation, particularly in view of making foresight actionable. Indeed, the involvement of stakeholders from an early stage of the foresight is important to provide the needed "traction" between the foresight results and the actual decision-making. This is also important for adding a change dimension to foresight, as our results also demonstrate that the more local the exercise the stronger the impact in terms of change.

5.1.2 Linking foresight experts with stakeholders and decision makers for impact

The results of the inventory confirm also several points highlighted in the literature on participation and impact in foresight. The first point is that the initial purpose of the foresight exercise determines the desirability of participation and the nature of impact. There are cases of informative foresight where foresight practitioners endeavors to generate knowledge, to understand what is at stake, without

intended connection to decision-making, but sometimes with the hope that their results will be a "grain of sand" which can trigger change in the long run. These cases are more likely to be found when the studies does not respond to an external demand but is initiated by researchers. Participation is more likely to be exclusive, limited to a restricted core-group of experts as there is no intention to generate consensus, or achieve buy-in. Dissemination of results through publications and conferences are the core means to expand the results beyond the core group of experts, towards stakeholders and decision makers. In many cases the role of foresight is to open options and reflect on their implications so that policy makers and other stakeholders can have more comprehensive views on the choices they have. Yet, this requires further debate, especially when we consider foresight has defined earlier in this document, which include planning dimensions. One of the key challenge for improved foresight is to link more effectively the results a foresight investigation/research with its use by stakeholders for decision, both in terms of tools and methods (linking visions to actions) and in terms of processes (including decision makers in the foresight research). This corresponds to a necessary move towards more inclusive or integrative foresight as issues of the futures of food and agriculture are multi-stakeholder concerns.

A second point is that national or sub-national foresight cases are linked with stronger participation and involvement of policy-makers as well as demands initiated from outside organizations. These features are more likely to be associated with change in policies either internally or externally, though there is no strong correlation to evidence it. Yet, 14 of 16 national scale cases recorded changes induced while five of ten global foresight cases recorded such impact, and three of these cases were initiated by a national institution on which the foresight cases produced a change (PBL, UK-FFF and SUS-2050). The focus of the more local exercises is closer to the specific concerns of local stakeholders. While global or regional foresight deals with big societal issues, tackled at a very aggregated level (food security, climate change, water scarcity, the world food system, agriculture in general), local level foresight focus on the same questions at a much more disaggregated level (conservation and land planning, environmental futures, animal health, national research priorities).

5.2 Opening a space for improved foresight: the Global Foresight Hub

After the 2010 Global Conference on Agricultural Research for Development stakeholders from all sectors have requested that GFAR mobilizes actions to improve the prioritization and focus of agricultural research and create more relevant and effective innovation systems [1].

The challenges ahead for food, agriculture and rural development are diverse and complex; economic, environmental and social dimensions affect future food and nutritional security, poverty reduction and the capacity to sustainably use natural resources. For wider utility and impact, further integration of knowledge and results of foresight into societal debates and policy making is needed. In order to enable this integration, the Global Forum on Agricultural Research has opened a space for collective action, the Global Foresight Hub. The Global Foresight Hub operates as an open and inclusive catalyzing mechanism, linking advanced research institutes, CGIAR centers and international policy bodies and initiatives within national and regional agricultural research and development organizations including farmer and civil society organizations. The Hub supports and interconnects three key activities contributing to provide opportunities toward improved foresight (Figure 4).

5.2.1. A forward thinking platform to stimulate foresight-based scientific debates

GFAR with the support of the European Forum for Agricultural Research and Development has established a "Forward Thinking Platform" as an inclusive mechanism for those engaged in future studies to share results, compare methods, and discuss controversies arising from their experiences. The focus of the platform members is on the future of food, agriculture and rural development, aiming at identifying common findings, controversies, and limits to the current knowledge with regard to future stakes. The platform has more thirty members working so far on a voluntary basis. Most of them are from advanced research institutions based in developed countries in the North and further development of the platform will require the inclusion of more and young foresight practitioners from the sectors and regions currently under-represented making space for different (alternative) points of view. The first outcomes of the platform was the identification of three major questions deserving

further attention from a foresight perspective: the farming patterns of the futures, future agricultural land uses and the future links between consumption and production. Platform members are currently working on these issues.

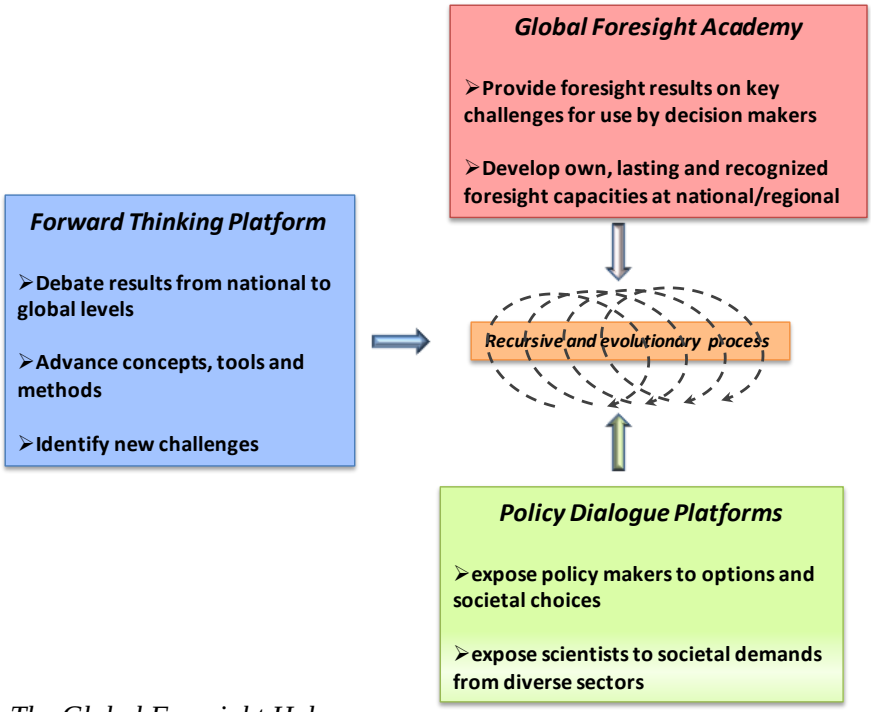

Figure 4. The Global Foresight Hub

5.2.2. Policy Dialogue Platforms connecting Science and Society

The GFH has a key function in ensuring regular dialogue between scientists, policy makers and civil society, enabling all stakeholders, especially representatives of smallholder farmers, to voice their visions and contribute to the societal choices shaping research, innovation and policy. "Policy Dialogue Platforms" constitute the main mechanism through which this connection takes place. Such platforms are venues where advances in foresight, facilitated through the Forward Thinking Platform, are debated. The GCARD 2 and its focus on foresight is one of these venues at global level. GCARD 2 achieved to raise the attention on the importance of foresight and the need to have a better balance of foresight studies at various scales and by various stakeholders. As a result several regional fora on agricultural research for development have publicly declared their intention to promote foresight in their region. In addition, a group of FO, NGO and CSO declared their intention to engage in and support a grassroots foresight process on the futures of family farming. This activity is included in the GFAR medium term plan and its implementation phase is currently under preparation.

5.2.3. A global foresight academy to develop capacity of all stakeholders in forward thinking

GFAR has started to open a space for collective capacity building, region by region, supporting the concept of a "Global Foresight Academy" with regional chapters. The Forum for African Research in Agriculture (FARA) has included foresight capacity development in its recent Plan of Action 2013-2016 and is supporting the African chapter of the global foresight academy. The concept of foresight academy is that of an arrangement at regional level for the development and recognition of skills and capacities of young professionals through the implementation of foresight works on high-priority issues across GFAR regional constituencies. Here, capacities refers to the technical expertise of (local, national) researchers to engage in collective forward looking. Such capacities can be built both through a "learning by doing" process, through exchange between such researchers and through early training.

Several cases at various scales explicitly indicate that the undertaking of a foresight study is also a learning or a capacity building process for many of the participants. They stress the importance of a

learning-by-doing approach (SAMAQQ, Kapuas, FORE-CAN) and its potential for capacity building (Teagasc; Agro-Colombia, SASP, Chile-2030).

They highlight two dimensions in foresight capacity development. The first one is the development of foresight competences within the organizations; the second one is the development of an institutional capacity to understand the value of foresight for decision making and develop a foresight culture within the organization. The first one concerns individual skill development in foresight and professional staff. The second concerns corporate foresight culture development at managerial level.

The GFH is a mechanism whose role is to set in motion a change in the practice of foresight and to link it with actionable collective initiatives based on a multi-stakeholder and complex approach of the futures. It is based on an underlying theory of change where individuals develop new habits as a key for inducing a change in institutions and structures and collective practices of foresight leading to stronger focus on discontinuities and to the emergence of new ideas, new challenges and new options for the future of agriculture. Through increased participation and stakeholder inclusion in foresight studies critical junctures can be explored leading to a change in the behavior of a growing number of individuals which can lead to new and different pathways at a time when several contingent factors coincide to create a potential discontinuity. Officially established in 2011 it has already gained international recognition during the meeting of the G20 on agriculture.

Figure 5 displays the path linking the GFH and the expected impact on the future sustainable development goals.

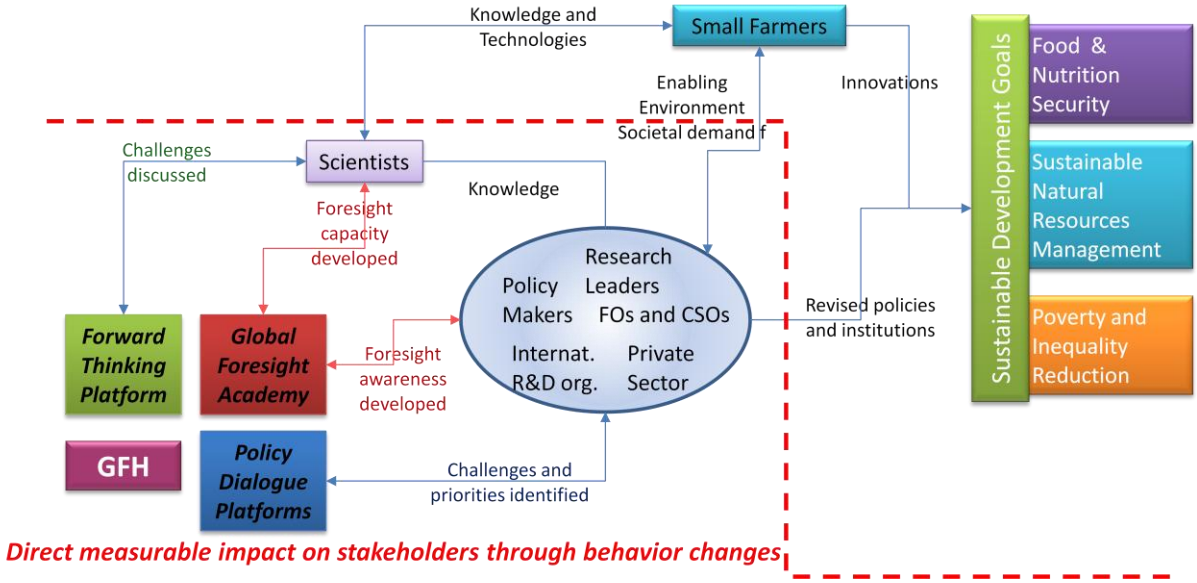

Figure 5. From foresight to impact, the role of the Global Foresight Hub

6. Conclusion

The world scene of foresight in agriculture shows a great diversity of global studies, based on quantitative or mixed methods, works with rather limited participation of stakeholders and national level foresight works using more mixed or qualitative methods associated with more participation of stakeholders. Most foresight studies are initiated by international organisations, government institutions and or national institutions in advanced or emerging countries. Least developed countries and the civil society are largely under-represented. Yet, more local level foresight is needed in connection to global initiatives. Regional or national issues are better explored with a combination of regional/national and local foresight. Local level anticipatory work can contribute to make global foresight studies more locally actionable.

Foresight capacity to influence stakeholders is witnessed by the numerous cases which have raised awareness and/or provoked debates based on their result. The capacity to change policy, and orient

actions is linked to the demand for foresight from a decision-maker, and the ability of foresight leaders to directly interact with decision makers in the policy setting process.

Impact evaluation is still insufficient and needs to be strengthened in future foresight works. Indeed, assessing the impacts of foresight is important to learn from the process, and inform future forward looking exercises, but this should be done taking into consideration whether the work aims at producing knowledge or at producing change.

Our results show that foresight for changing societal behavior has greater chances of success if done at local level where the possibilities to directly include decision makers are greater. However, global level works may lead to great(er) impact if they change the way a large number of people, or prominent leaders think/behave/act/make decisions. Stronger impact of foresight includes also a capacity building process, through which practitioners and stakeholders learn, share and discuss. The process, in itself, is as important as the results of the work.

The Global Foresight Hub created through the Global Forum on Agricultural Research is an initiative who answers the call to "enhance the international foresight collaboration in terms of exchange of experiences and the implementation of common foresight projects" [10], in order to better address major societal challenges for the futures of food, agriculture and rural development. It is designed to provide an open and inclusive space towards improved foresight on food, agriculture and rural development. Its three components, a forward thinking platform, policy dialogue platforms and a global foresight academy with regional chapters are designed to establish stronger exchange between foresight practitioners worldwide, to better link them to stakeholders and decision makers and to bridge the capacity gap to engage in foresight by developing foresight at national level and regional level and for farmers and civil society organizations.

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